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- Model
- Data

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- Beliefs about beliefs of others
- Coordination
- Paper assets and finance amplify this aspect

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- Not good at macro-forecasting
- Good at predicting "unintended consequences"
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Money Taxes and Transfers
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- \( \omega = (\omega_1, \ldots, \omega_h, \ldots, \omega_n) > 0 \) is the vector of chocolate endowments
\[ x_h = \omega_h - P^m_T h \quad h = 1, \ldots, n \]
\[ x_h = \omega_h - P^m \tau_h \quad h = 1, \ldots, n \]

\[ \text{CP} \begin{cases} 
\max U_h(x_h) \\
\text{subject to: } x_h > 0 \text{ and } x_h = \omega_h - P^m \tau_h 
\end{cases} \]
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\( P^m \geq 0 \) defines a C.E. if CP holds for \( h = 1, \ldots, n \) and materials balance.
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\[
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\]
Summing over individuals:

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so

\[ P^m = 0 \quad \text{or} \quad \sum_{h=1}^{n} \tau_h = 0 \quad \text{or both} \]
Bonafide Taxes and Balanced Taxes

- \( \tau = (\tau_1, \ldots, \tau_h, \ldots, \tau_n) \) is said to be balanced if we have \( \sum_{h=1}^{n} \tau_h = 0 \), i.e., if taxes exactly offset subsidies.
- \( \tau \) is said to be bonafide if there is at least one CE in which \( P^m > 0 \). (In other words, \( \tau \) is a good faith policy).
- We have shown that if \( \tau \) is imbalanced, then \( \tau \) is not bonafide. Every bonafide \( \tau \) is balanced in this simple finite economy.
Bonafide implies balanced. Is the converse true? That is, are bonafide policies and balanced policies equivalent?
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To show: $\tau$ balances $\Rightarrow \tau$ bonafide.

Define the tax-adjusted endowment

$\bar{\omega} = (\bar{\omega}_1, \ldots, \bar{\omega}_h, \ldots, \bar{\omega}_n) = (\omega_1 - P^m\tau_1, \ldots, \omega_h - P^m\tau_h, \ldots, \omega_n - P^m\tau_n)$. 
Bonafide implies balanced. Is the converse true? That is, are bonafide policies and balanced policies equivalent?

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\tilde{\omega} = (\tilde{\omega}_1, \ldots, \tilde{\omega}_h, \ldots, \tilde{\omega}_n) = (\omega_1 - P_m \tau_1, \ldots, \omega_h - P_m \tau_h, \ldots, \omega_n - P_m \tau_n).
\]

Since \( \omega > 0 \), for \( P_m > 0 \) sufficiently small, we have \( \tilde{\omega} > 0 \). The CE for this \( \tilde{\omega} \) (without money) yields \( x > 0 \) and \( \sum_h x_h = \sum_h \tilde{\omega}_h = \sum_h (\omega_h - P_m \tau_h) = \sum_h \omega_h - P_m \sum_h \tau_h = \sum_h \omega_h \). Hence there are \( P_m > 0 \) in money-tax equilibrium.
Outside Money Taxation: Examples

\( l = 1, n = 6, \omega = (\omega_1, \ldots, \omega_h, \ldots, \omega_6) = (100, 90, 10, 10, 10, 10) \)
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Example 1

\[ \tau = (20, 20, -10, -10, -10, -10) \]

\[ \sum_h \tau_h = 0 \Rightarrow \tau \text{ bonafide} \]

2 guys (Mr. 1 and Mr. 2) are taxed.
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Mr. 1:

\[ 100 - 20P^m > 0 \]
\[ 20P^m < 100 \]
\[ P^m < 5 \]
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2 guys (Mr. 1 and Mr. 2) are taxed.

Mr. 1:

$$100 - 20P^m > 0$$

$$20P^m < 100$$

$$P^m < 5$$

Mr. 2:

$$90 - 20P^m > 0$$

$$20P^m < 90$$

$$P^m < \frac{9}{2} < 5$$

\( P^m = [0, \frac{9}{2}) \) \( P^m \) is the set of equilibrium money prices
Example 2

\[ \tau = (100, 90, -20, -20, -20, -20) \]

\[ \sum_{h} \tau_h = 100 + 90 + 4(-20) = 110 \neq 0 \]

\( \tau \) not balanced \( \Rightarrow \) \( \tau \) not bonafide

\( \mathcal{P}^m = \{0\} \)
Example 3

\[\tau = (2, 2, -1, -1, -1, -1)\]

\[\sum_{h} \tau_{h} = 4 - 4 = 0\]

\(\tau\) balanced \(\Rightarrow\) \(\tau\) bonafide

Mr. 1

\[100 - 2P^{m} > 0\]

\[2P^{m} < 100\]

\[P^{m} < 50\]

Mr. 2

\[90 - 2P^{m} > 0\]

\[2P^{m} < 90\]

\[P^{m} < 45\]

\(P^{m} = [0, 45)\)
Example 4

\[ \tau = (0, 0, -5, -5, -5, -5) \]

\[ \sum_{h} \tau_h = 0 - 20 = -20 \neq 0 \]

\( \tau \) not balanced \( \Rightarrow \) \( \tau \) not bonafide

\( \mathcal{P}^m = \{0\} \)
Example 5

\[ \tau = (0, 0, 0, 0, 0, 0) \]

\[ \sum_{h} \tau_h = 0 \]

\( \tau \) balanced \( \Rightarrow \) \( \tau \) bonafide

\[ \mathcal{P}^m = [0, \infty) \]

\( \mathcal{P}^m \) is indeterminate because there are no money trades at any price.
Money Taxation Take-aways:

- In some cases, the equilibrium allocation $x$ is unique, but generally $x$ depends on consumer beliefs about $P^m$.
- Fundamentals do not completely determine economic outcomes. Beliefs are important: this is a basic source of financial fragility.
- Compare to Ben Stein’s remark.